Configuring and Testing Your Network

Network Fundamentals – Chapter 11

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Version 4.0

Objectives

- Define the role of the Internetwork Operating System (IOS).
- Use Cisco CLI commands to perform basic router and switch configuration and verification.
- Given a network addressing scheme, select, apply, and verify appropriate addressing parameters to a host.
- Use common utilities to verify network connectivity between hosts.
- Use common utilities to establish a relative performance baseline for the network.

Role of Internetwork Operating System (IOS)

- Identify several classes of devices that have IOS embedded

Cisco IOS

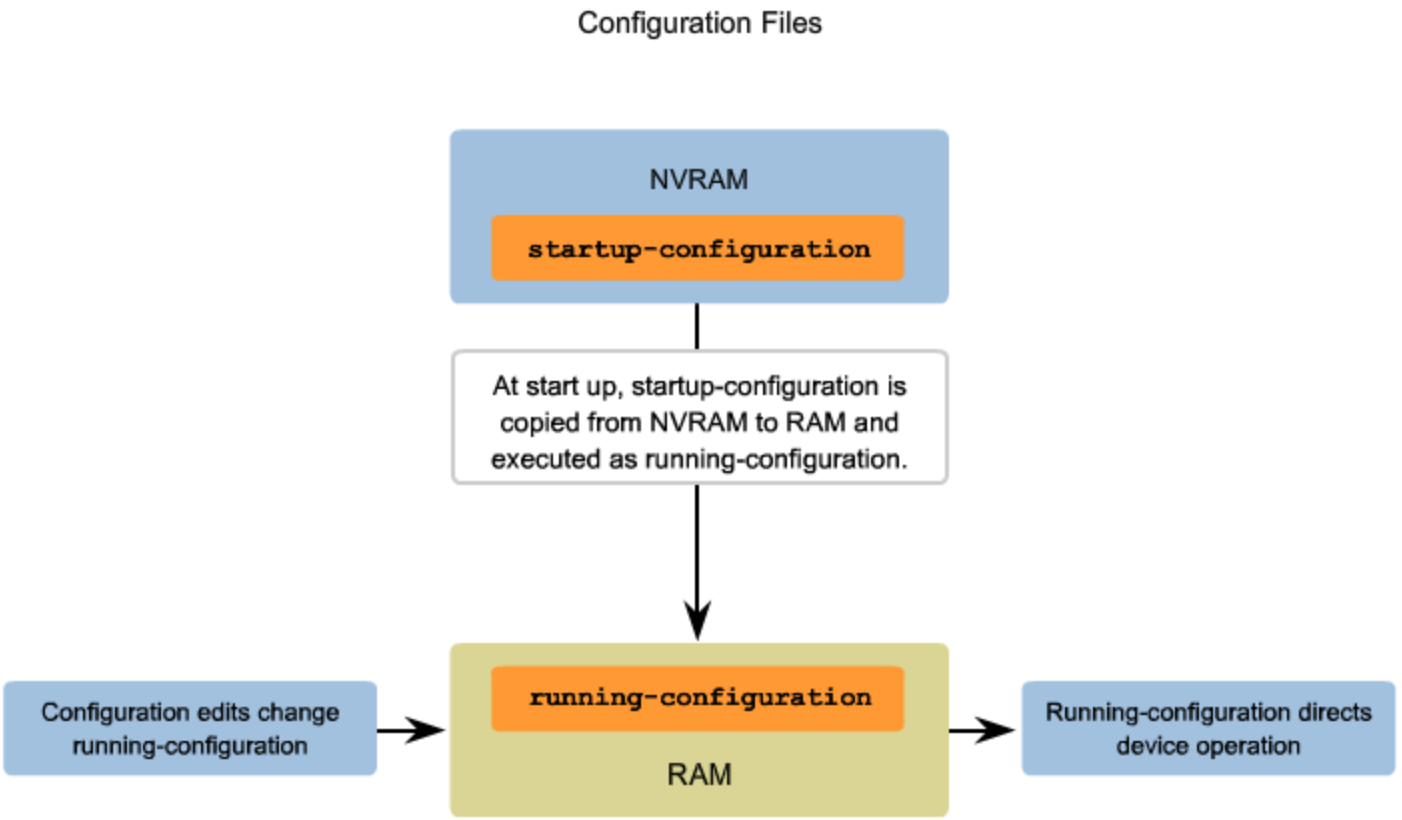
Internetwork Operating System for Cisco networking devices

SECURITY | ADDRESSING | INTERFACES | ROUTING | QoS

MANAGING RESOURCES

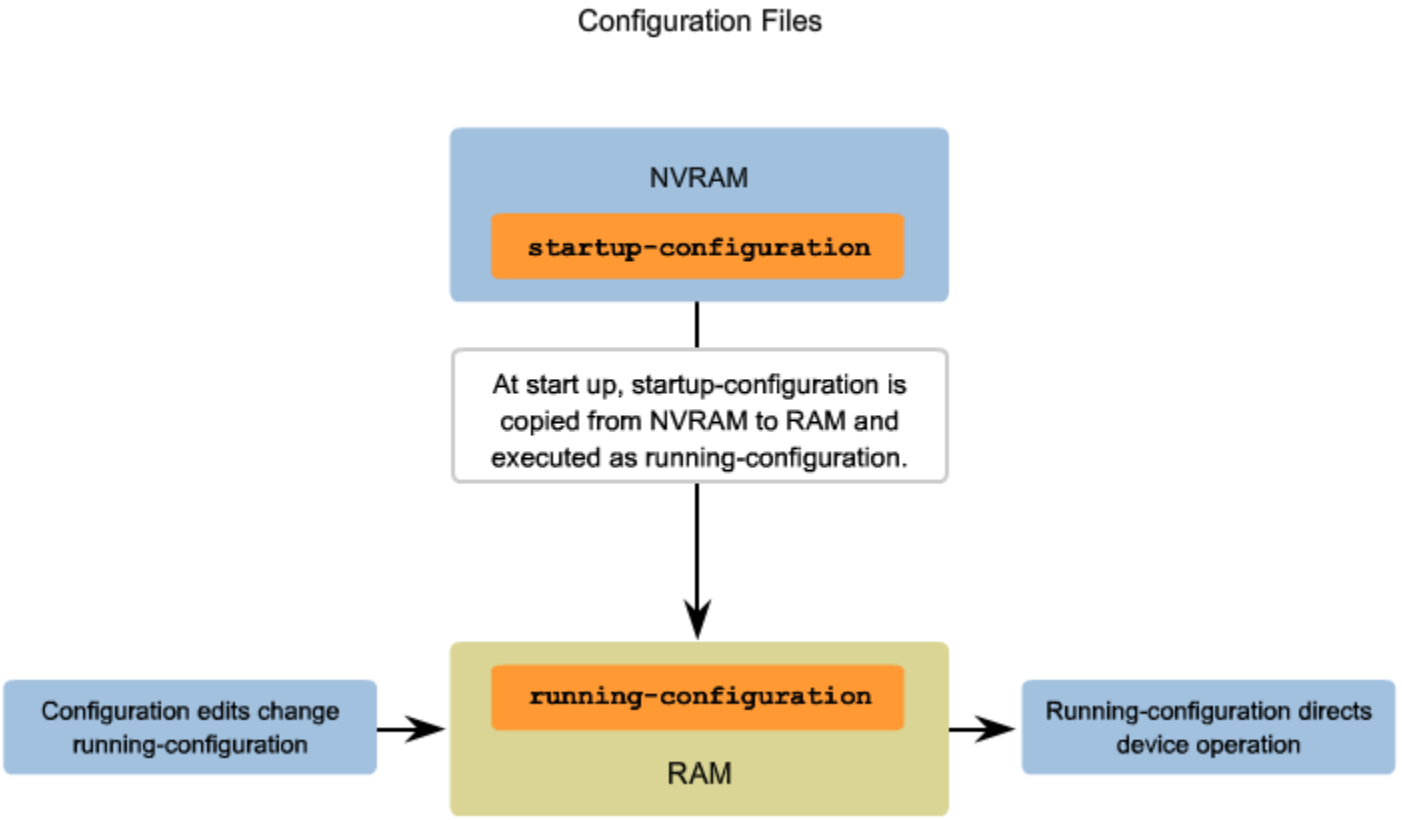
Role of Internetwork Operating System (IOS)

- Define the purpose of startup config



Role of Internetwork Operating System (IOS)

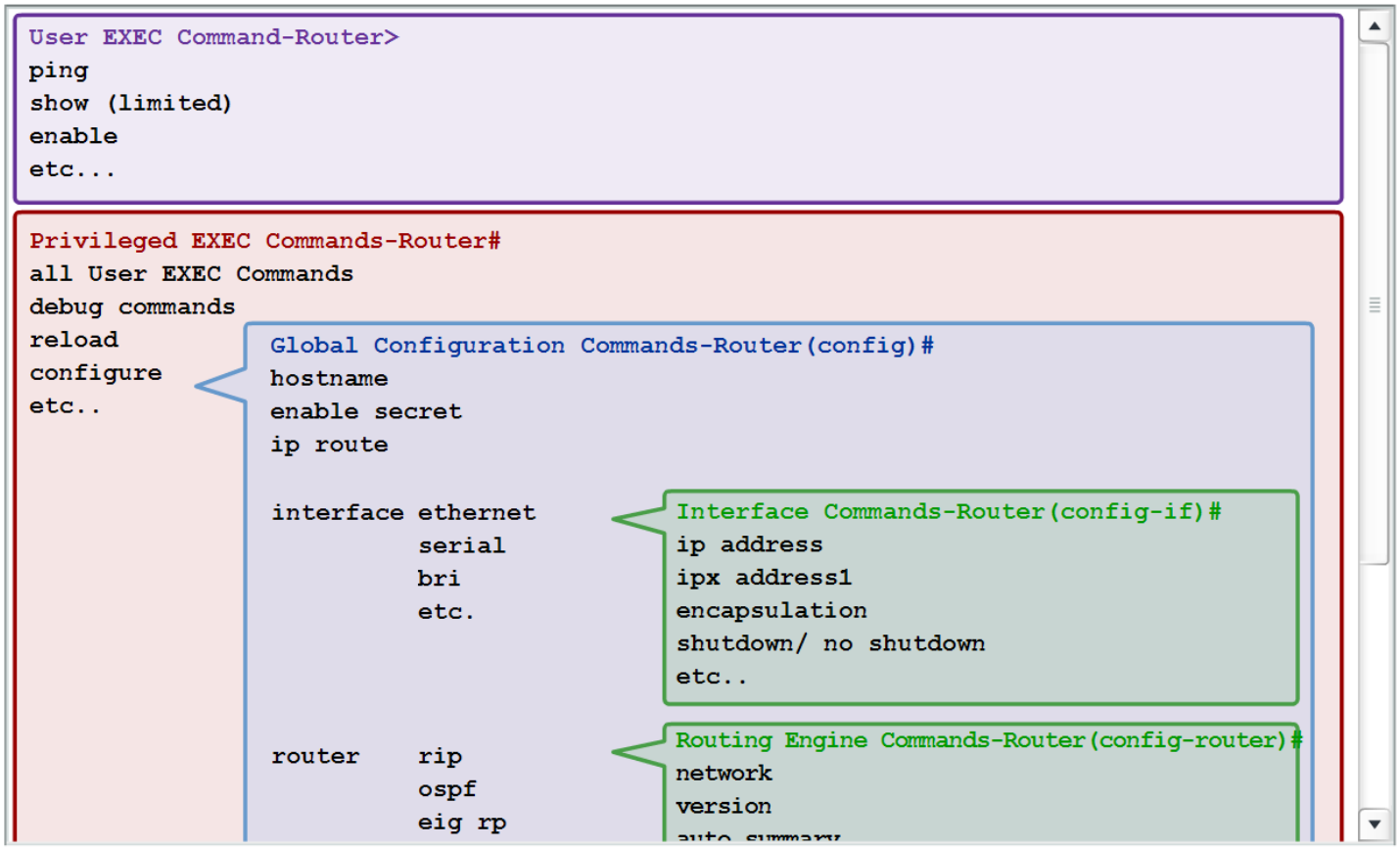
- Identify the relationship between IOS and config



Role of Internetwork Operating System (IOS)

- Recognize that Cisco IOS is modal and describe the implications of modes

IOS Mode Hierarchical Structure



Role of Internetwork Operating System (IOS)

- Define the different modes and identify the mode prompts in the CLI

IOS Primary Modes

User EXEC Mode
Limited examination of router.
Remote access.

```
Switch>
Router>
```

Global Configuration Mode
Simple configuration commands.

```
Switch(config)#
Router(config)#
```

Privilleged EXEC Mode
Detailed examination of router, Debugging and testing. File manipulation. Remote access.

```
Switch#
Router#
```

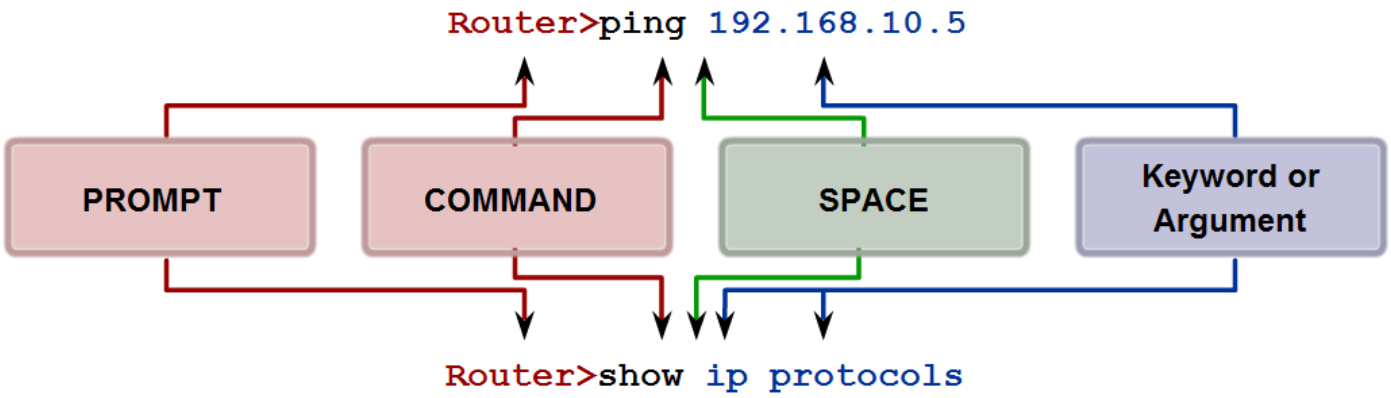
Other Configuration Modes
Complex and multiple-line configurations.

```
Switch(config-mode)#
Router(config-mode)#
```

Role of Internetwork Operating System (IOS)

- Identify the basic command structure for IOS commands

Basic IOS Command Structure



Prompt commands are followed by a space and then the keyword or arguments.

Role of Internetwork Operating System (IOS)

- Identify the types of help and feedback available while using IOS and use these features to get help, take shortcuts and ascertain success

Context Sensitive Help

Example of a sequence of commands using the CLI context sensitive help

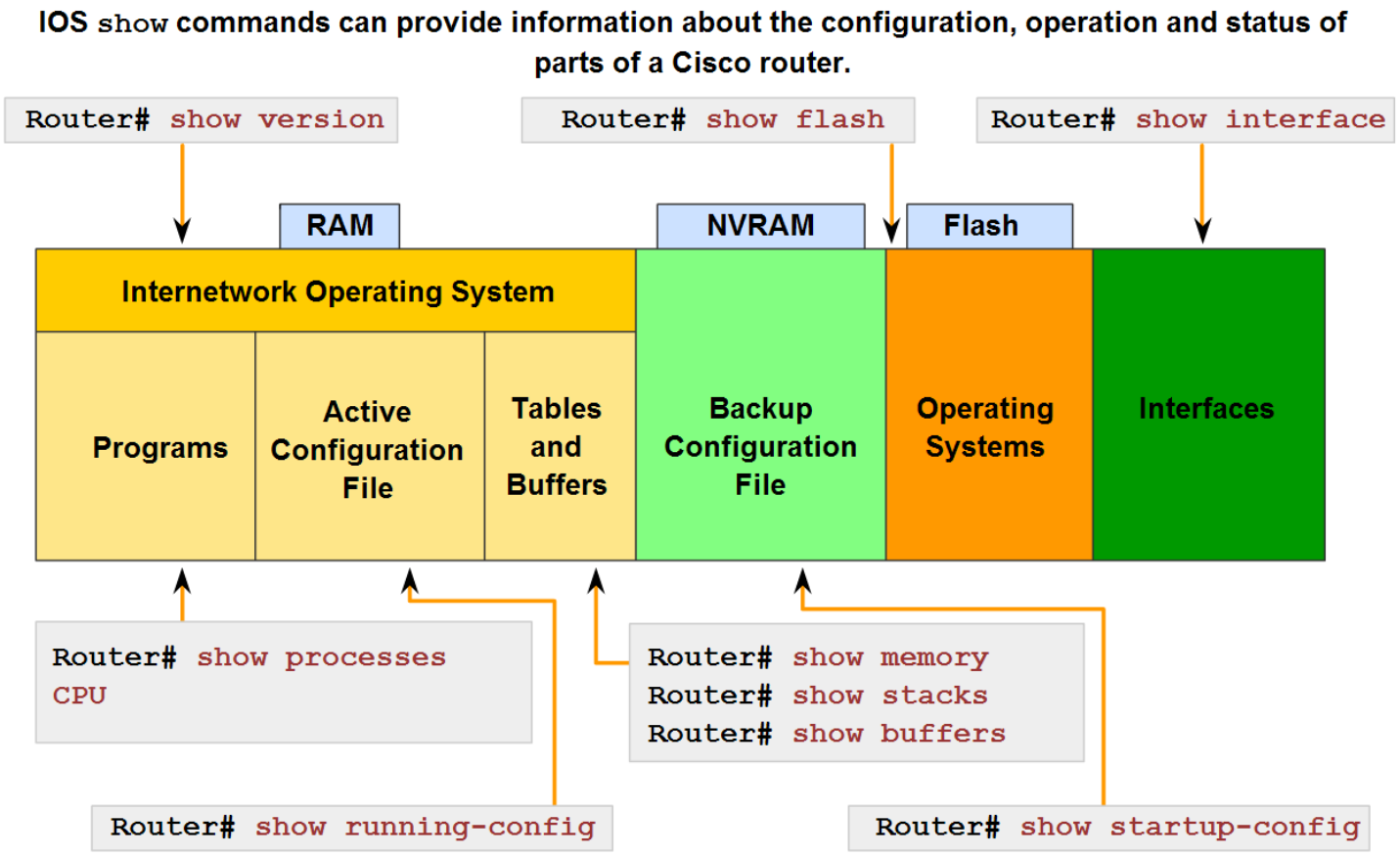
```
Cisco#cl?
clear  clock
Cisco#clock ?
  set  Set the time and date
Cisco#clock set
% Incomplete command.
Cisco#clock set ?
  hh:mm:ss  Current Time
Cisco#clock set 19:50:00
% Incomplete command.
```

```
Cisco#clock set 19:50:00 ?
  <1-31>  Day of the month
  MONTH   Month of the year
Cisco#clock set 19:50:00 25 6
                            ^
Invalid input detected at '^' marker.
Cisco#clock set 19:50:00 25 June
% Incomplete command.
Cisco#clock set 19:50:00 25 June ?
  <1993-2035>  Year
Cisco#clock set 19:50:00 25 June 2007
Cisco#
```

Command explanations
Incomplete Command messages
Invalid input messages
Variable formats

Role of Internetwork Operating System (IOS)

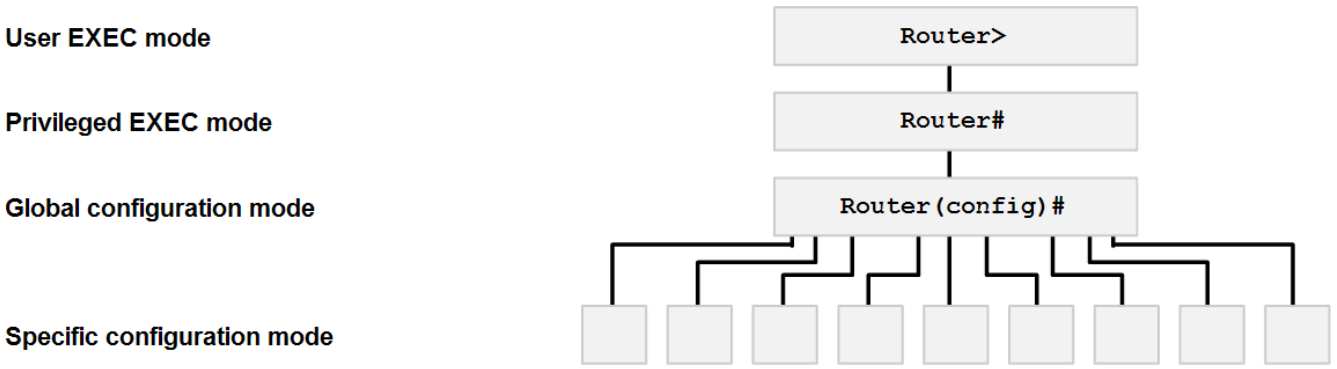
- Identify the purpose of the show command and several of its variations



Role of Internetwork Operating System (IOS)

- Identify several of the configuration modes, their purpose and their associated prompt

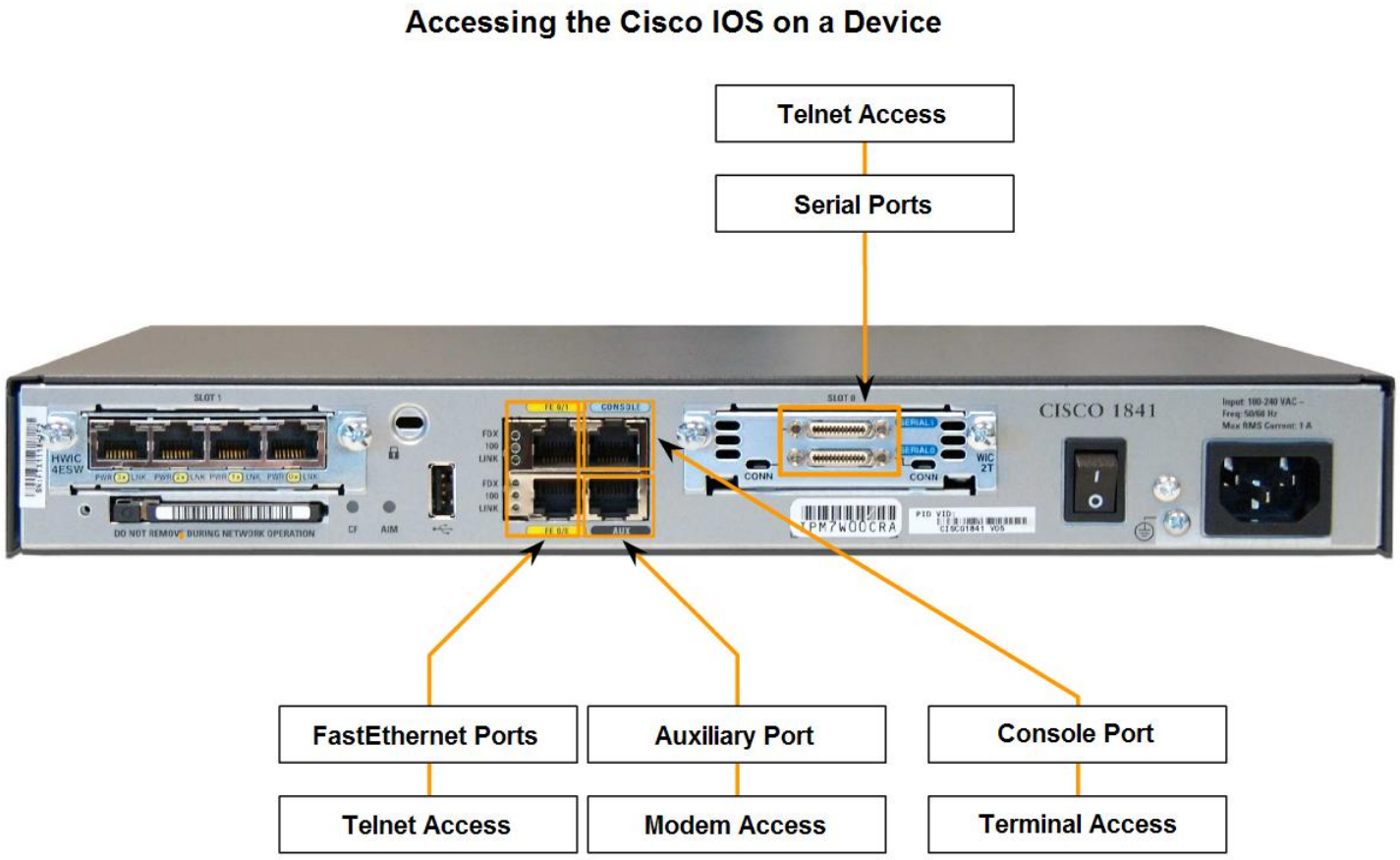
IOS Configuration Modes



Configuration Mode	Prompt
Interface	Router(config-if)#
Line	Router(config-line)#
Routers	Router(config-router)#

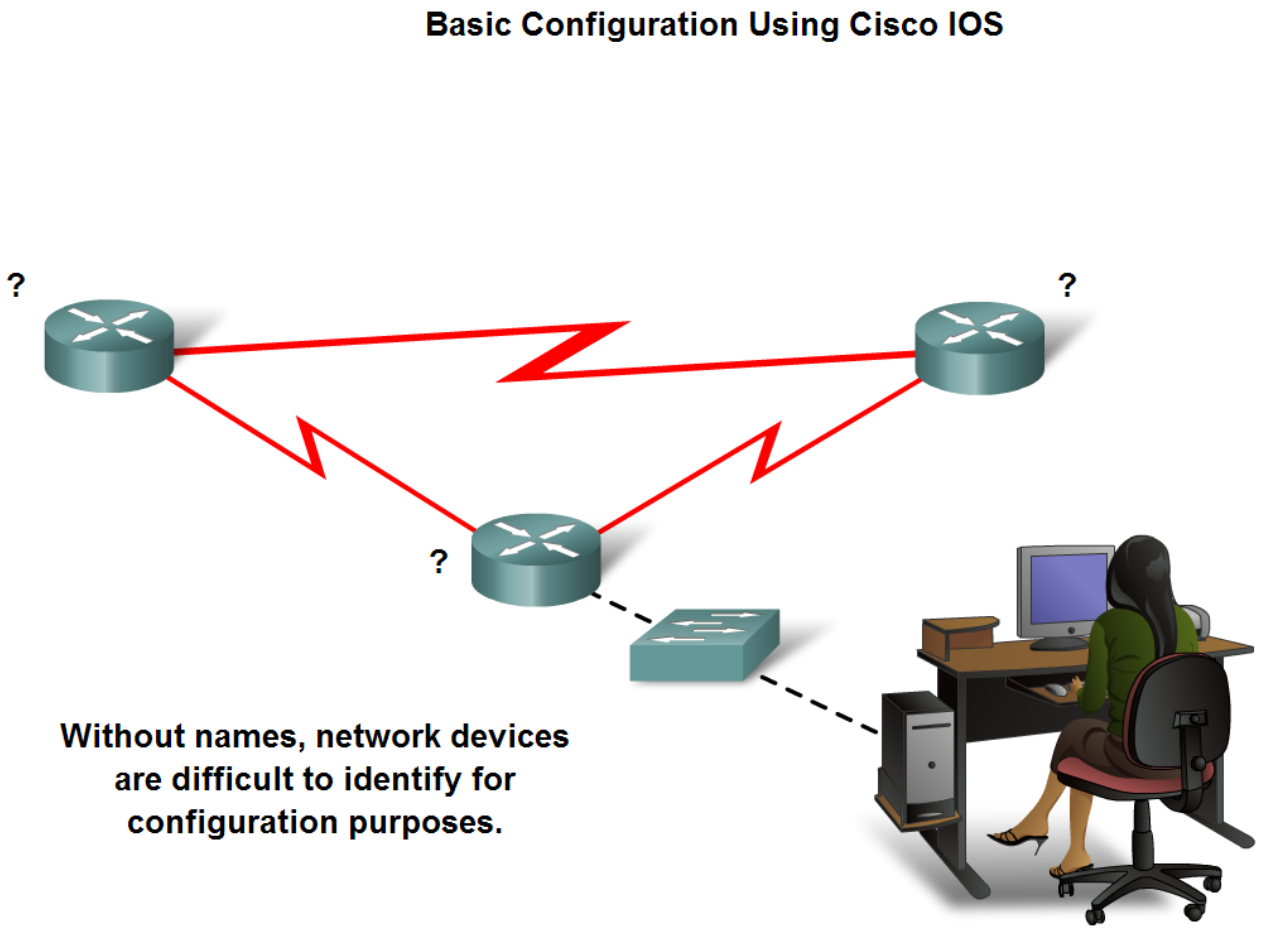
Role of Internetwork Operating System (IOS)

- Use the CLI to access various IOS configuration modes on a device



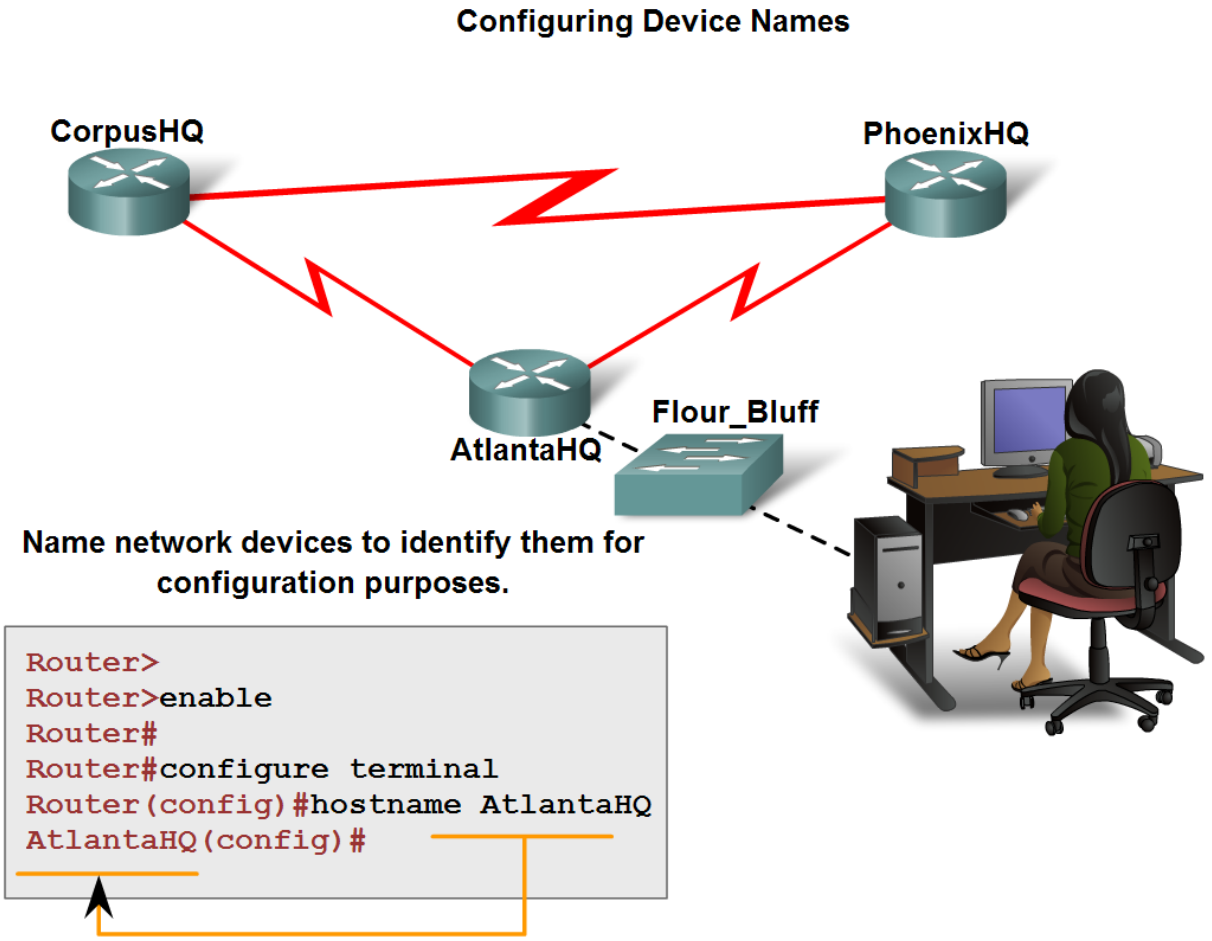
Use Cisco CLI Commands to Perform Basic Router & Switch Configuration and Verification

- Explain the reasons for naming devices



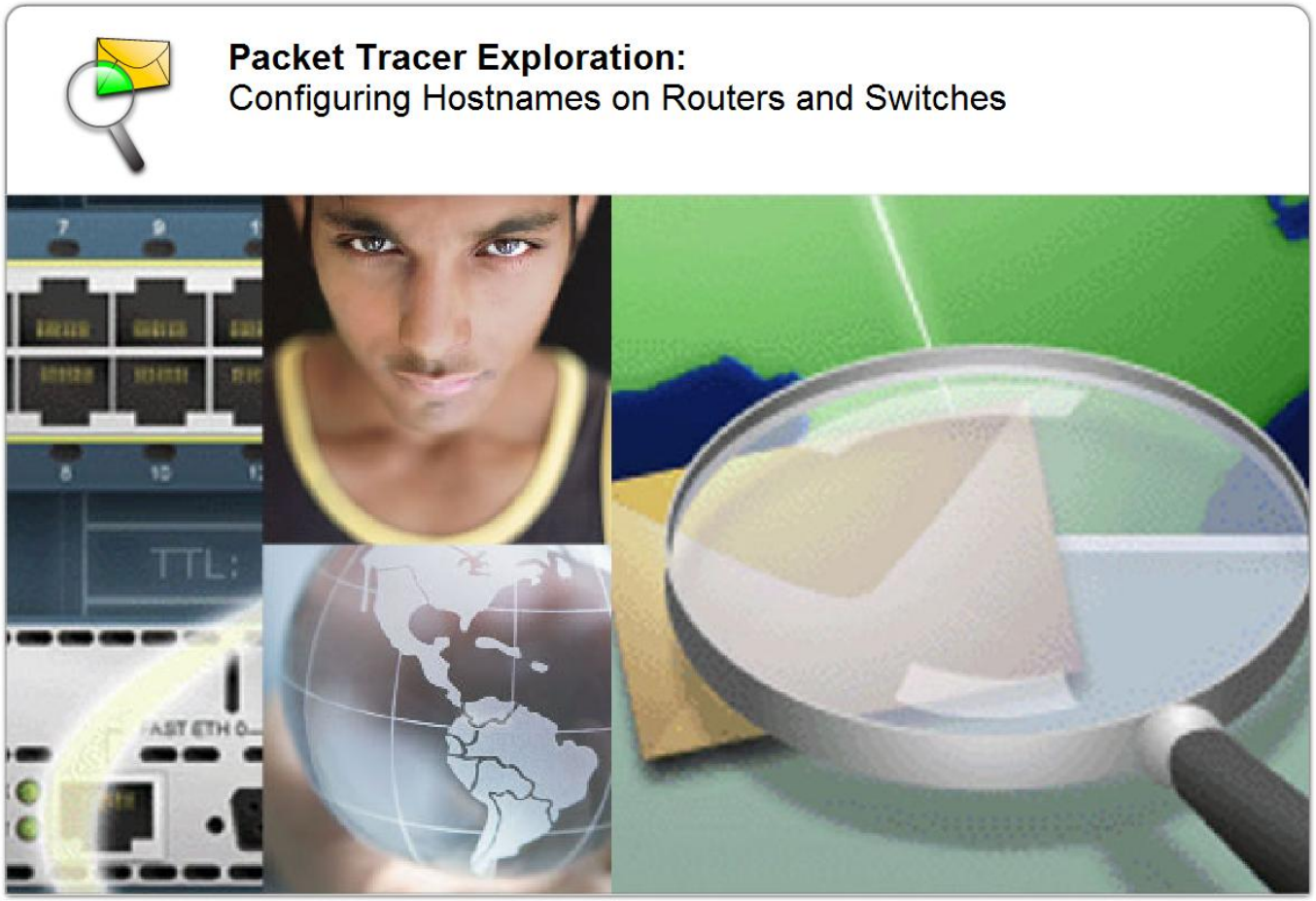
Use Cisco CLI Commands to Perform Basic Router & Switch Configuration and Verification

- Describe two common approaches to establishing naming conventions



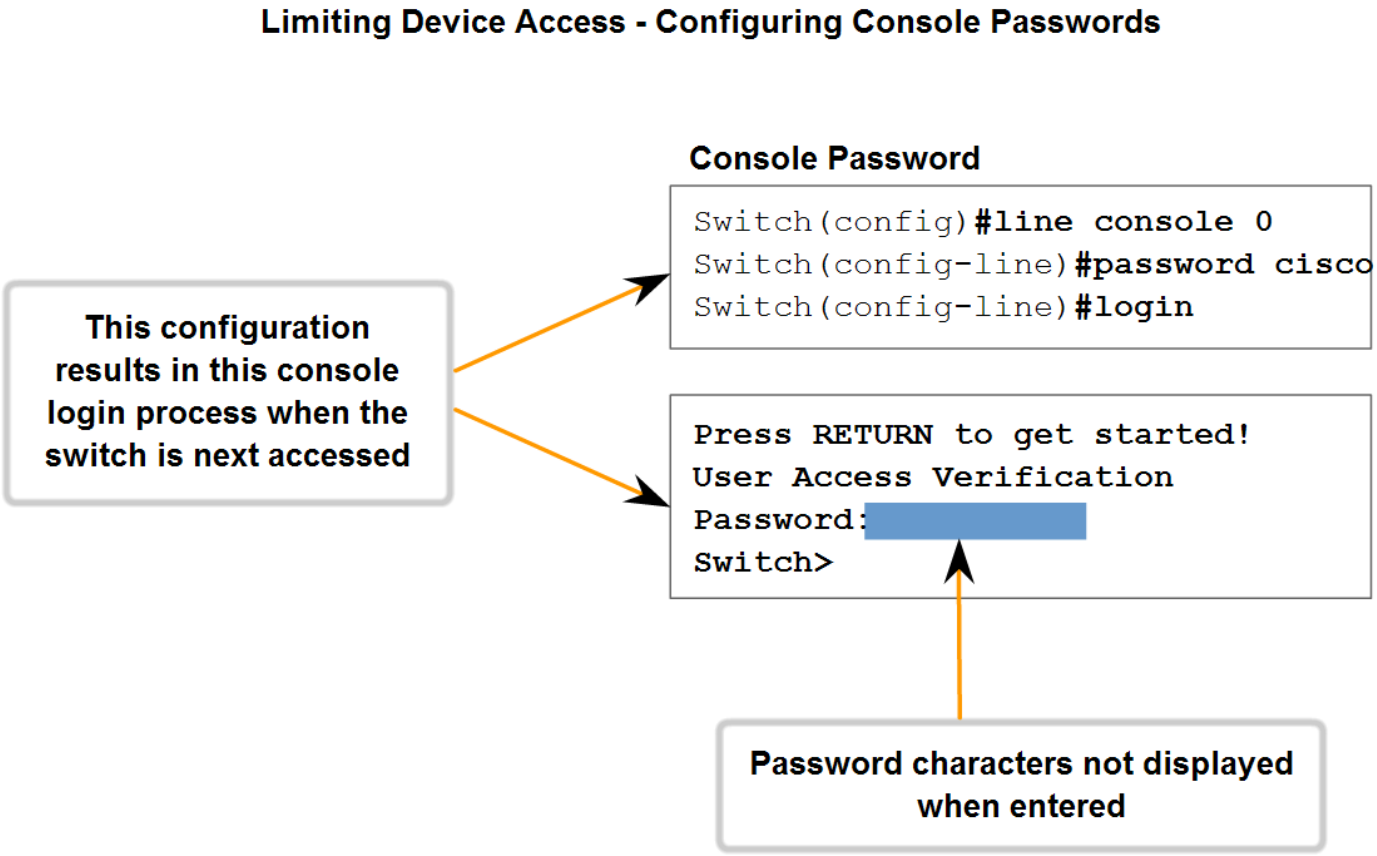
Use Cisco CLI Commands to Perform Basic Router & Switch Configuration and Verification

- Based on a diagram, configure host names using the CLI



Use Cisco CLI Commands to Perform Basic Router & Switch Configuration and Verification

- Describe the role of passwords in limiting access to device configurations



Use Cisco CLI Commands to Perform Basic Router & Switch Configuration and Verification

- Describe several ways in which access to a device configuration can be limited

Limiting Device Access
Configuring Telnet and Password Encryption

Virtual Terminal Password

```
Router(config)#line vty 0 4
Router(config-line)#password cisco
Router(config-line)#login
```

Enable Password

```
Router(config)#enable password san fran
```

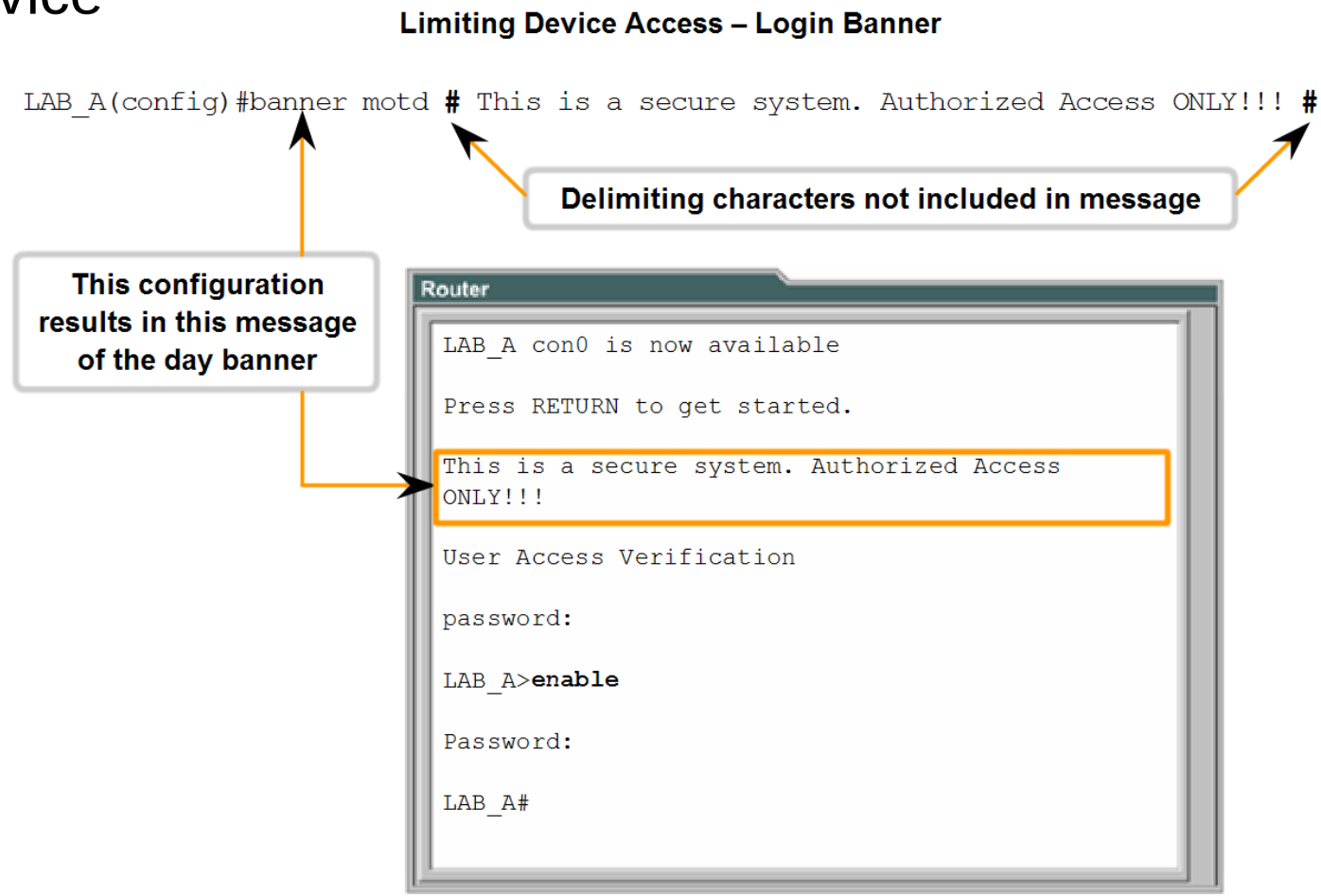
Enable Secret Password

```
Router(config)#enable secret cisco
```

Strongly encrypted password

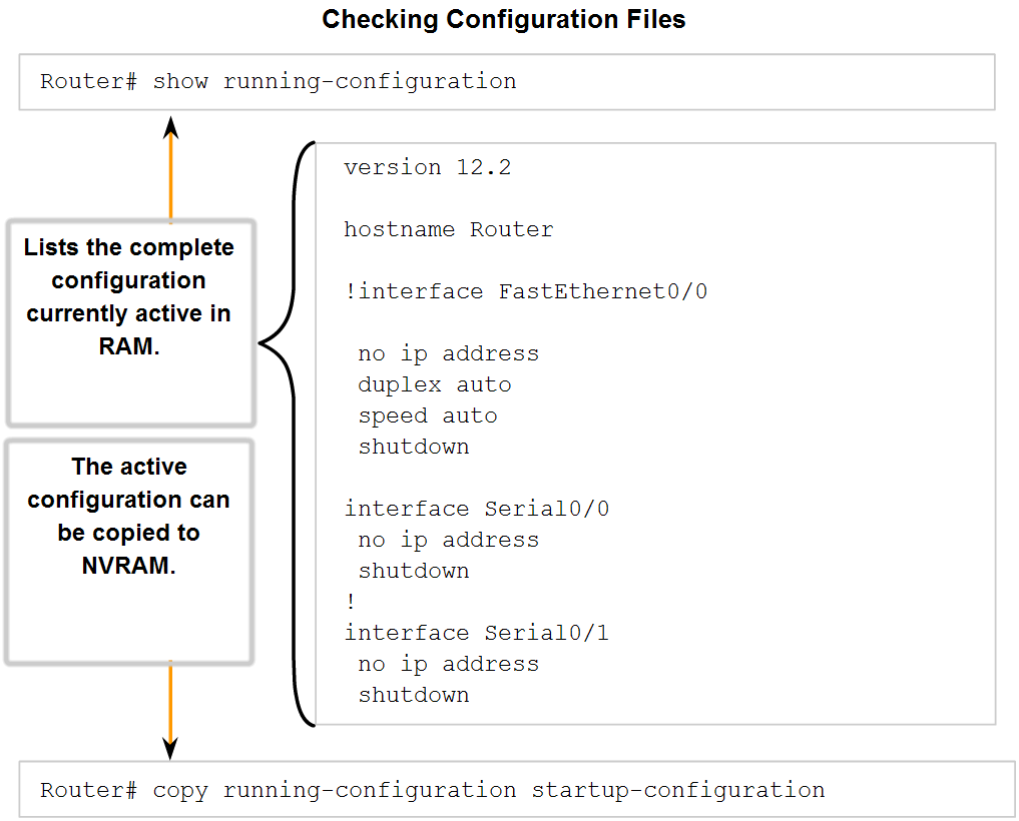
Use Cisco CLI Commands to Perform Basic Router & Switch Configuration and Verification

- Use the CLI to set passwords and add banners to a device



Use Cisco CLI Commands to Perform Basic Router & Switch Configuration and Verification

- Trace the steps used to examine the startup config, make changes to config, and replace the startup config with the running config



Use Cisco CLI Commands to Perform Basic Router & Switch Configuration and Verification

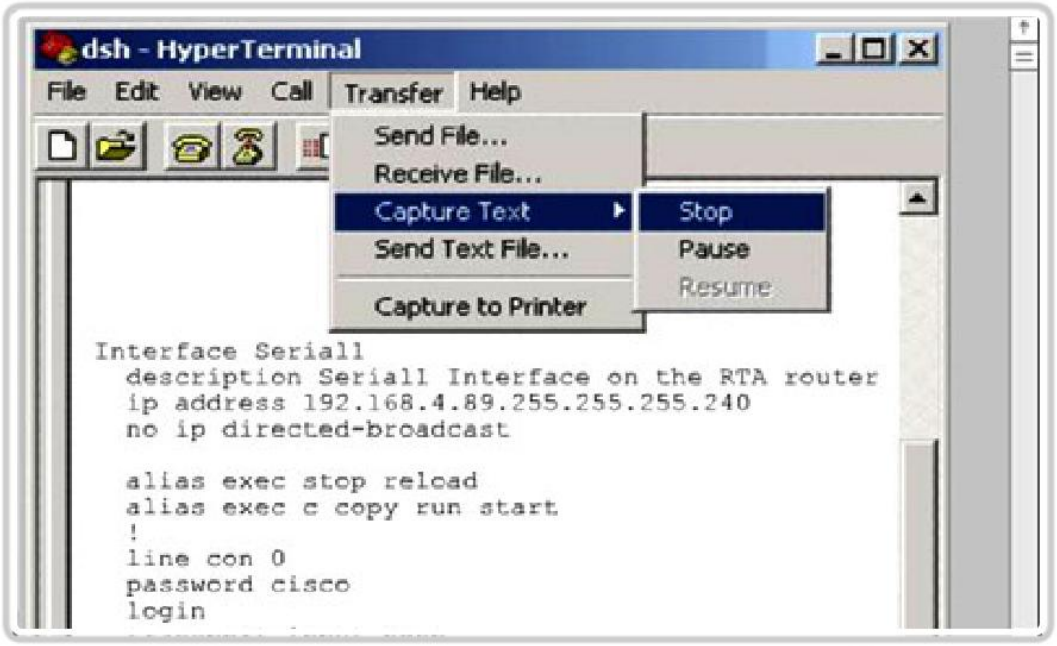
- Use basic IOS config commands to manage a device.

```
Router#copy running-config tftp
Remote host []? 131.108.2.155
Name of configuration file to write[tokyo-config]?tokyo.2
Write file tokyo.2 to 131.108.2.155? [confirm] y
Writing tokyo.2 !!!!!! [OK]
```

Use Cisco CLI Commands to Perform Basic Router & Switch Configuration and Verification

- Use a text file to backup and restore config settings

Saving to a Text File in Hyperterminal



In the terminal session:
1. Start the text capture process
2. Issue a `show running-config` command
3. Stop the capture process
4. Save the text file

Use Cisco CLI Commands to Perform Basic Router & Switch Configuration and Verification

- Identify the role of a router in a network.

Configuring Router Interfaces

All interfaces are accessed by issuing the `interface` command at the global configuration prompt.

In the following commands, the *`type`* argument includes serial, ethernet, fastethernet, and others:

```
Router(config)#interface type port
Router(config)#interface type slot/port
Router(config)#interface type slot/subslot/port
```

The following command is used to administratively turn off the interface:

```
Router(config-if)#shutdown
```

The following command is used to turn on an interface that has been shutdown:

```
Router(config-if)#no shutdown
```

The following command is used to quit the current interface configuration mode:

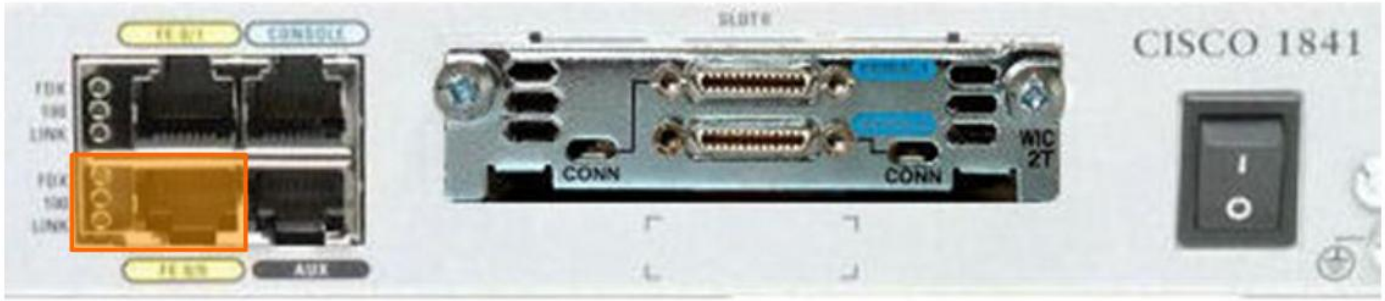
```
Router(config-if)#exit
```

When the configuration is complete, the interface is enabled and interface configuration mode is exited.

Use Cisco CLI Commands to Perform Basic Router & Switch Configuration and Verification

- Describe the purpose of having multiple interfaces in one router

Configuring Router Ethernet Interfaces




```
Router(config)#interface FastEthernet 0/0
Router(config-if)#ip address 192.168.10.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
```

Configure Router Ethernet Interfaces

Use Cisco CLI Commands to Perform Basic Router & Switch Configuration and Verification

- Explain the purpose of assigning interface descriptions to a router

Router Interfaces Descriptions


```
Router(config)#interface FastEthernet 0/0
Router(config-if)#description  Building B Sales LAN
Router(config-if)#exit
```

Description is all text after this space

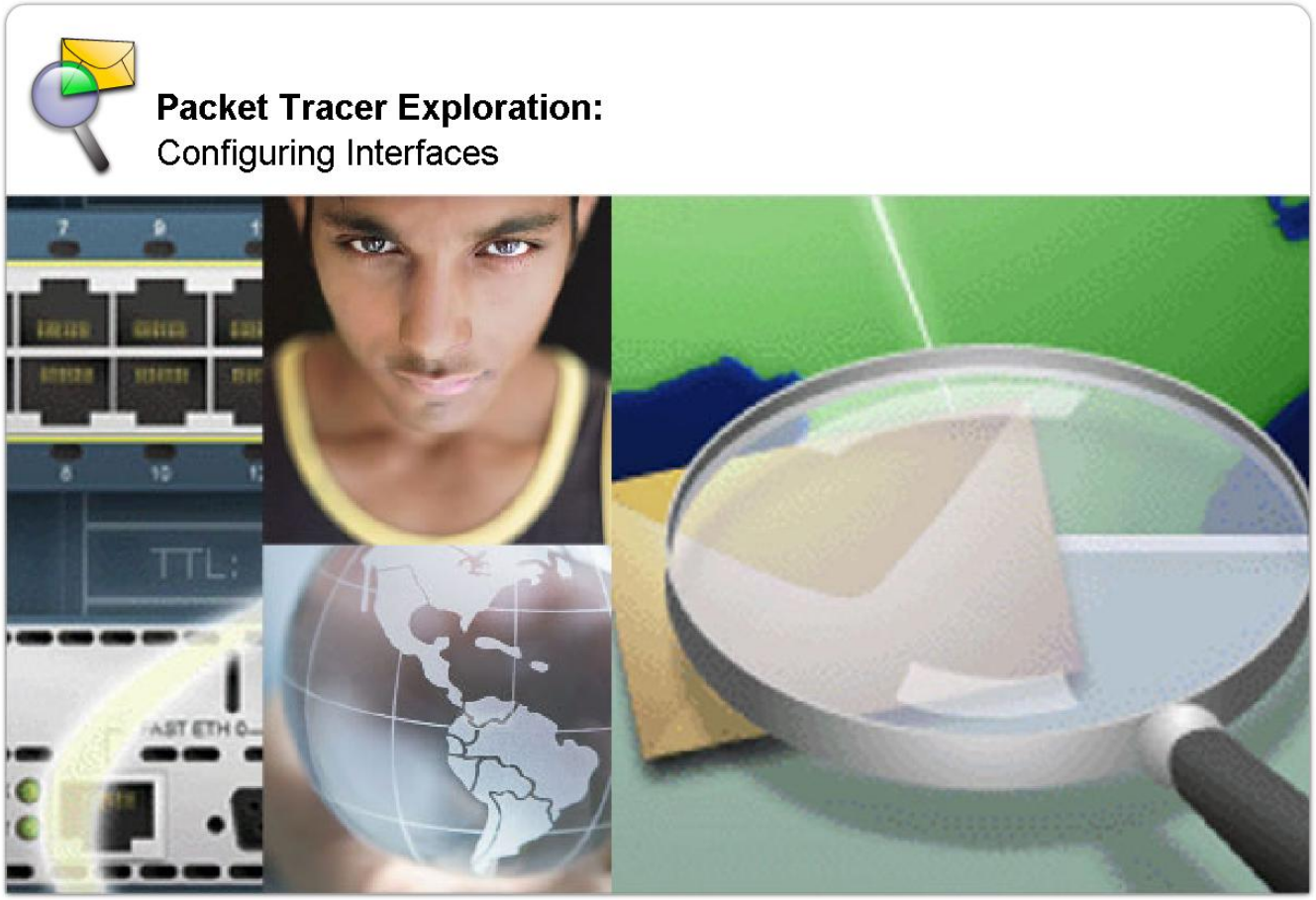
Interface description used for internal network documentation

```
Router(config)#interface Serial 0/0/0
Router(config-if)#description  To Perth CKT-PT27834365-01
Router(config-if)#exit
```

Description is all text after this space

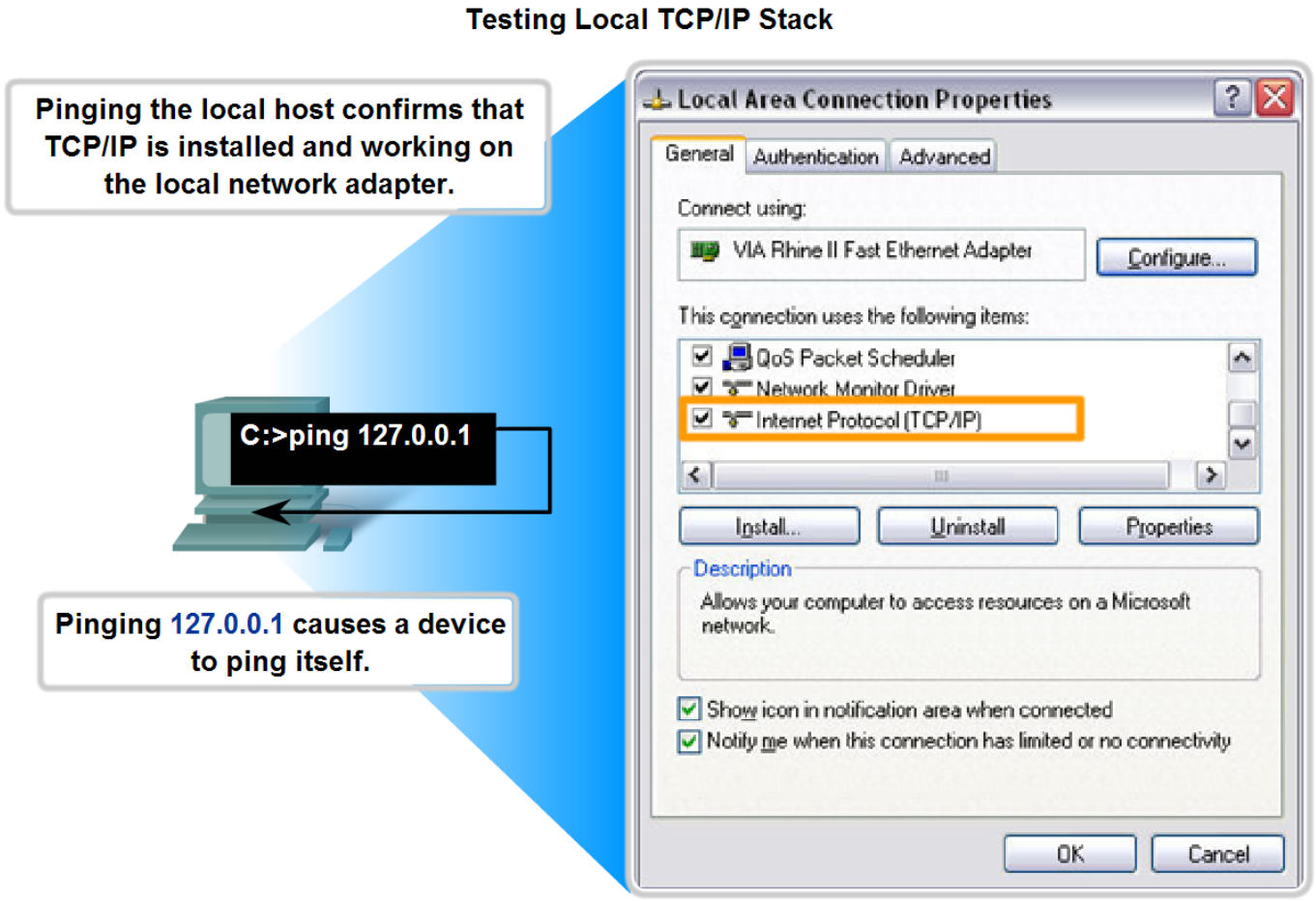
Use Cisco CLI Commands to Perform Basic Router & Switch Configuration and Verification

- Assign a router interface, assign a meaningful interface description, and enable the interface



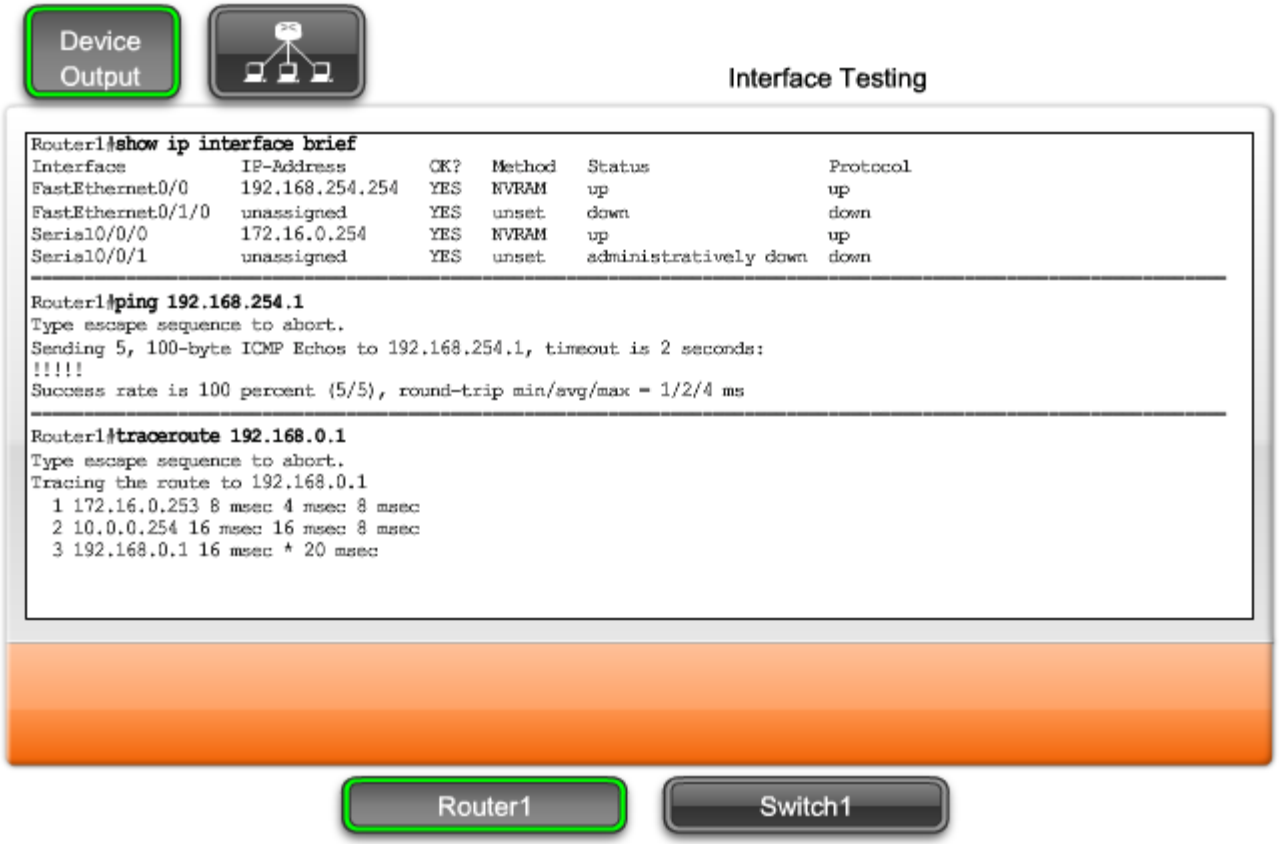
Select, Apply, and Verify Appropriate Addressing Parameters to a Host

- Given a type of host and a master addressing scheme, trace the steps for assigning host parameters to a host



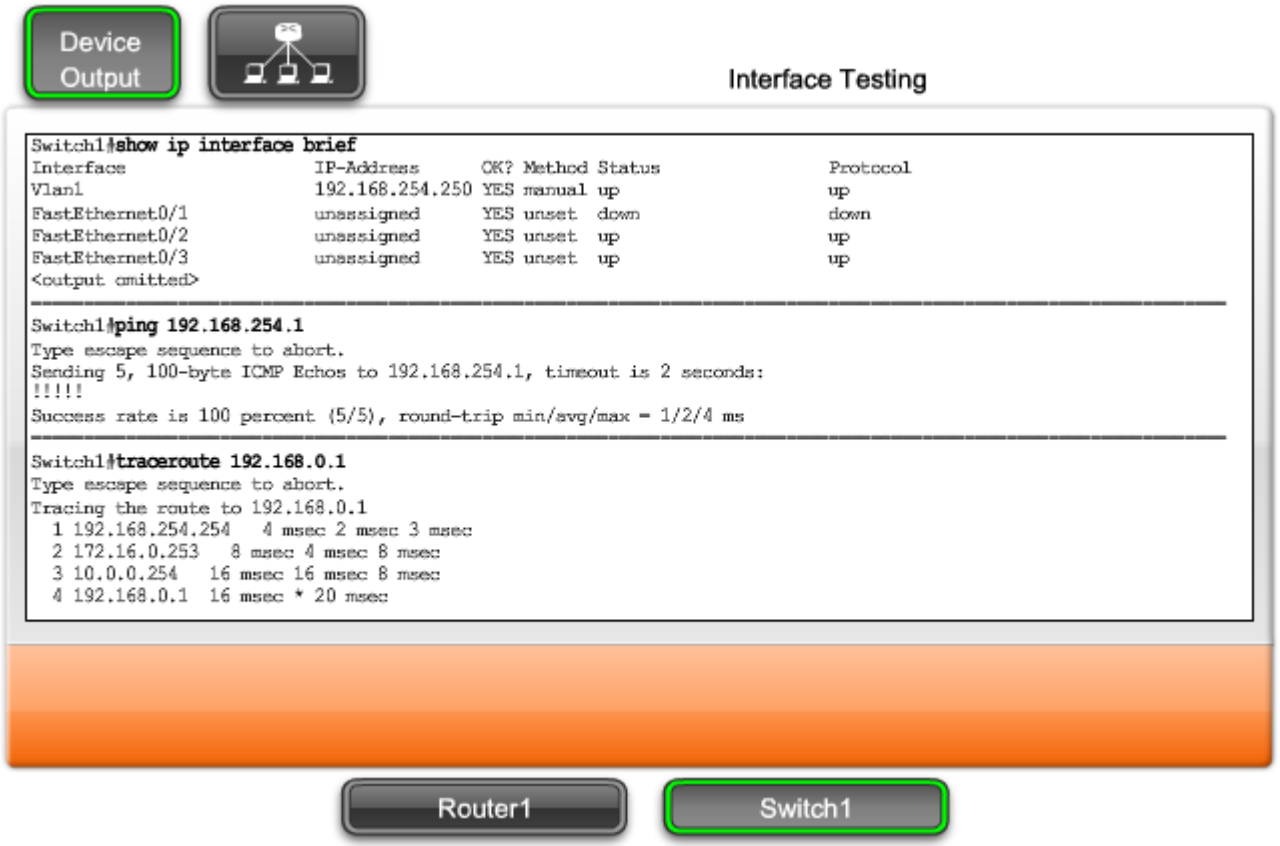
Select, Apply, and Verify Appropriate Addressing Parameters to a Host

- Trace the steps for using ipconfig/ifconfig to verify host parameter assignments and for using ping to test assignments



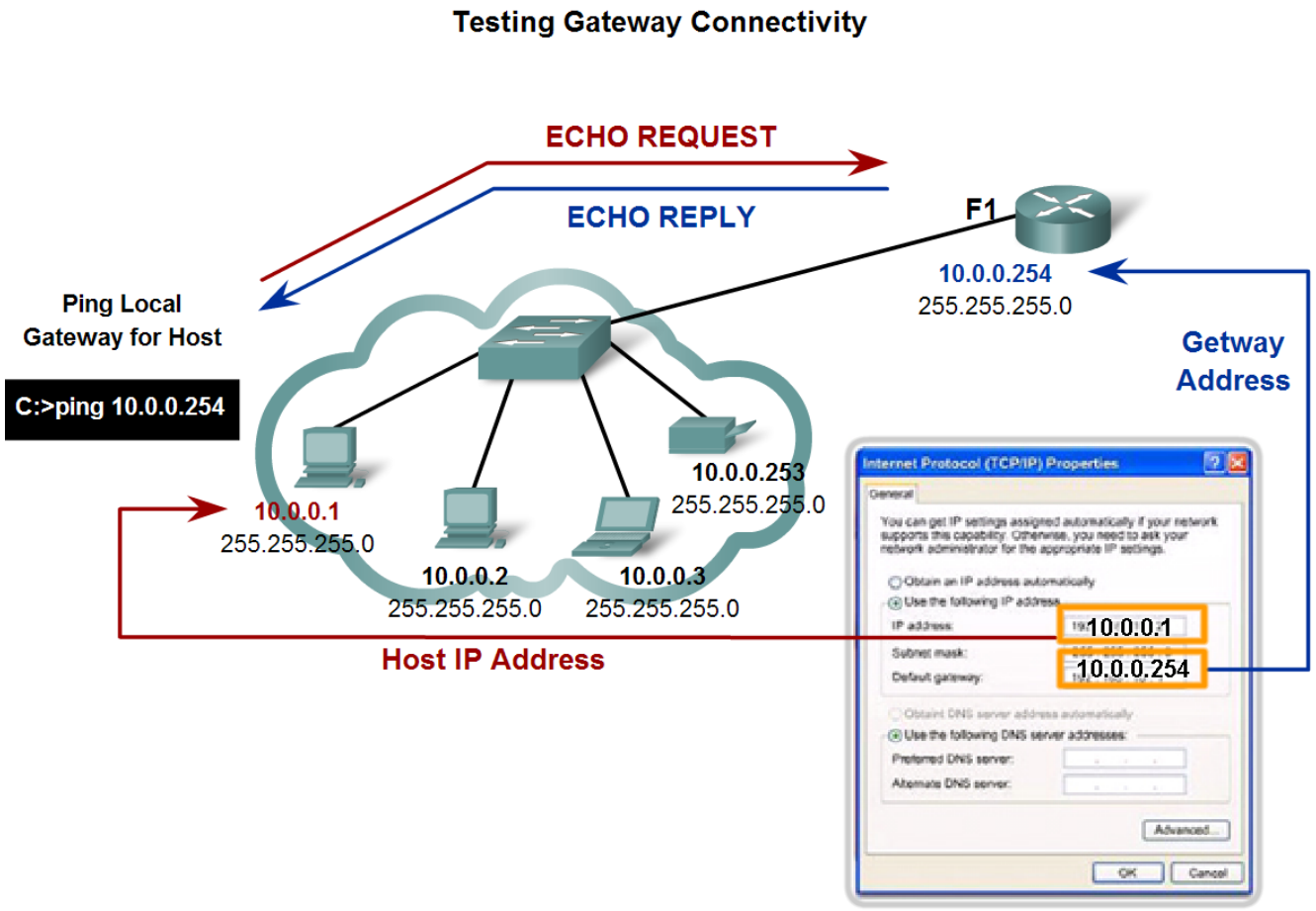
Select, Apply, and Verify Appropriate Addressing Parameters to a Host

- Identify two ways parameters can be assigned to hosts



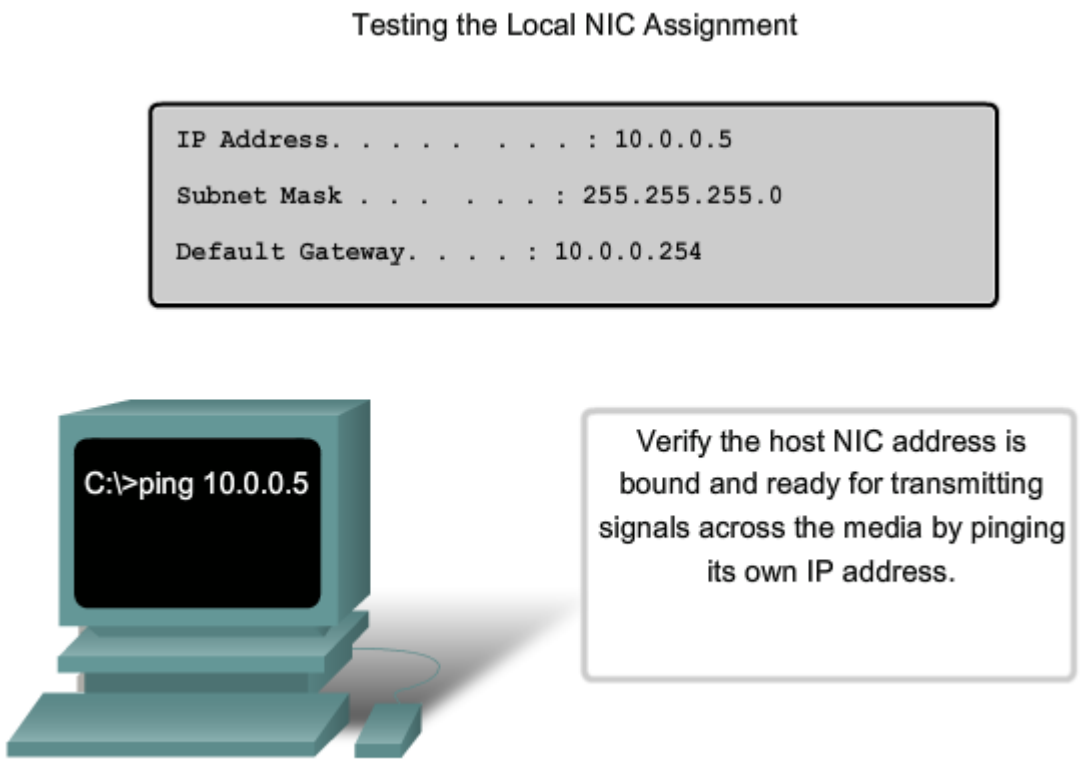
Use Common Utilities to Verify Network Connectivity Between Hosts

- Use the ping command in the CLI to determine if the IP protocol is operational on a local host



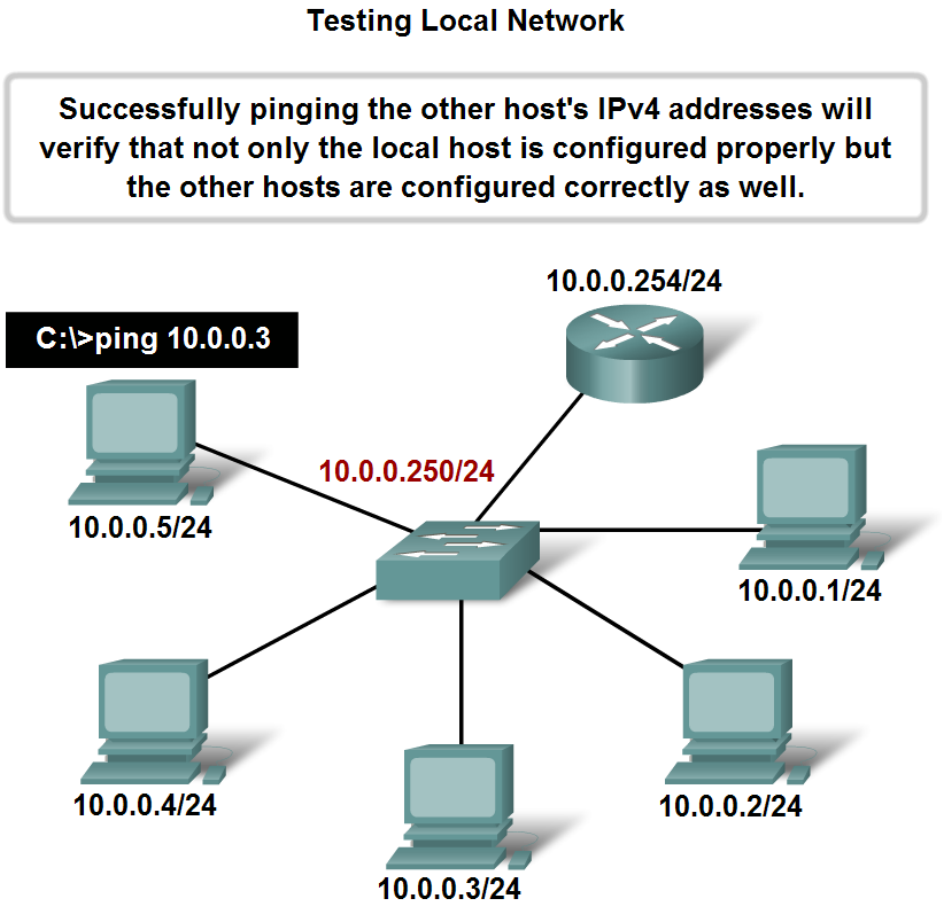
Use Common Utilities to Verify Network Connectivity Between Hosts

- Use the ping command to determine if the IP protocol is properly bound to an NIC



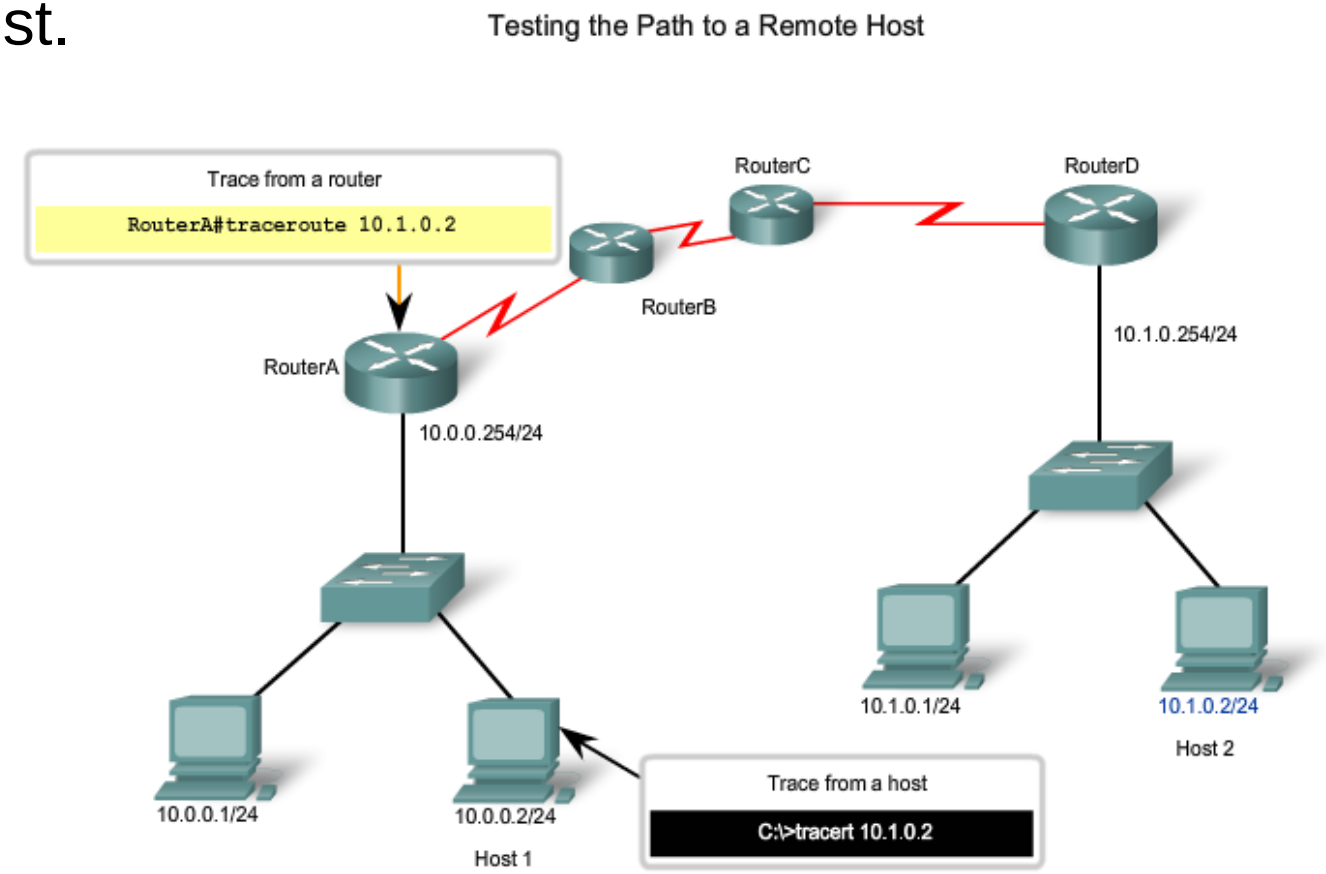
Use Common Utilities to Verify Network Connectivity Between Hosts

- Use the ping command to determine if a host can actively communicate across the local network



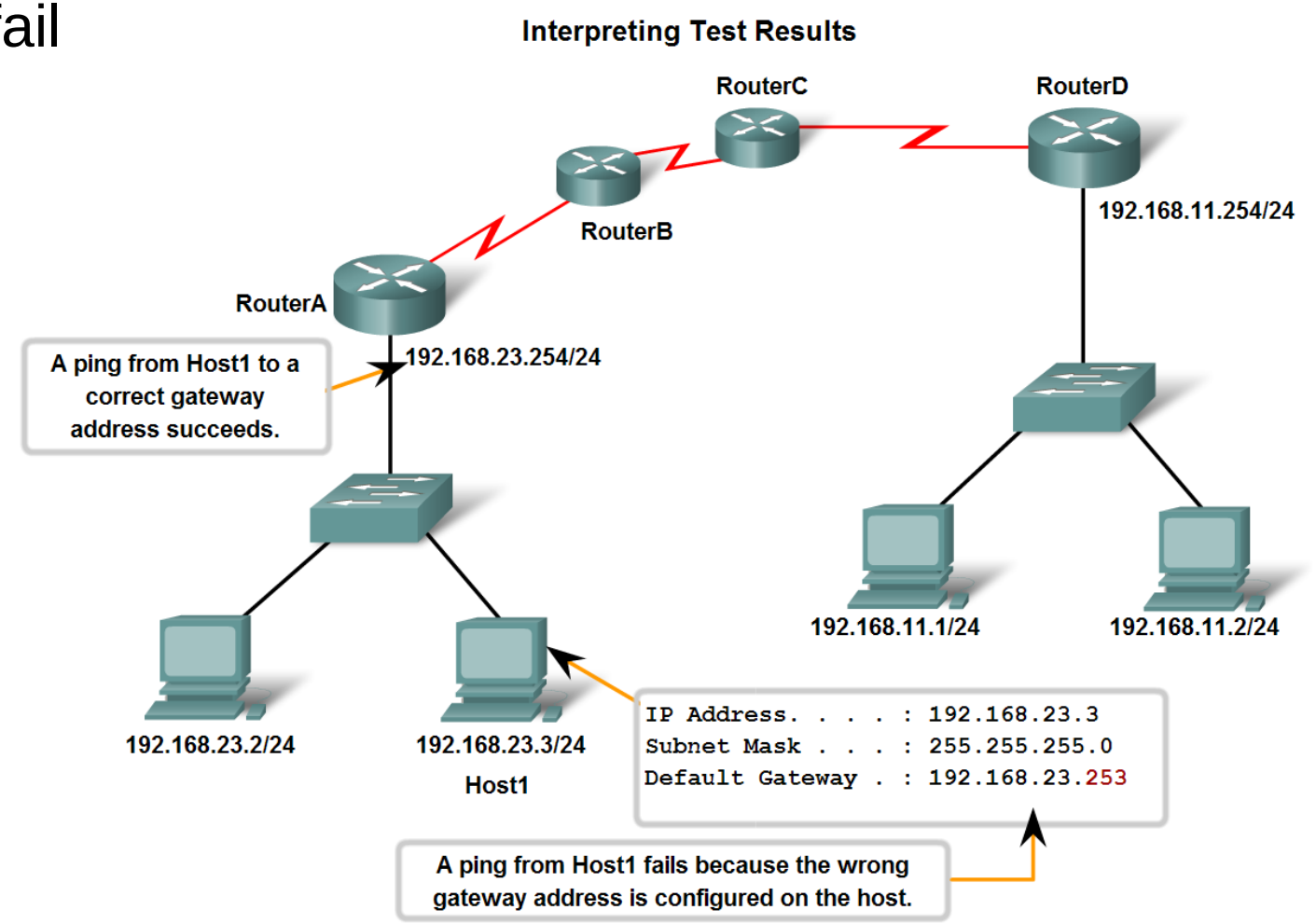
Use Common Utilities to Verify Network Connectivity Between Hosts

- Use the ping command to verify that the local host can communicate across the internetwork to a given remote host.



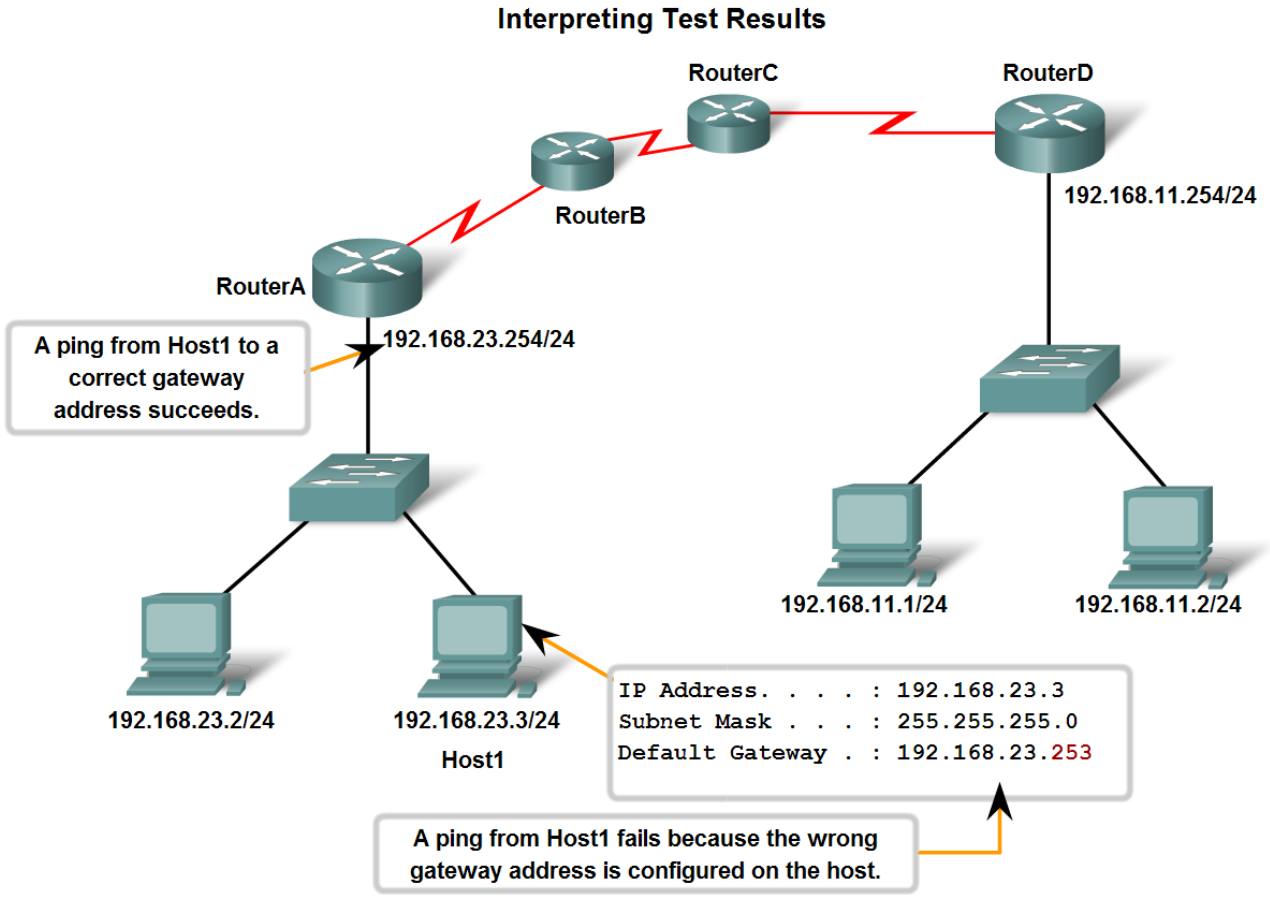
Use Common Utilities to Verify Network Connectivity Between Hosts

- Identify several conditions that might cause the test to fail



Use Common Utilities to Verify Network Connectivity Between Hosts

- Use trace commands to identify network connectivity problem



Use Common Utilities to Establish a Relative Performance Baseline for the Network

- Use the output of the ping command, saved into logs, and repeated over time, to establish relative network performance

Baseline with ping

FEB 2, 2007 08:14:43

```
C:\host1>ping 10.66.254.159

Pinging 10.66.254.159 with 32 bytes of data:

Reply from 10.66.254.159: bytes=32 time<1ms TTL=128
Reply from 10.66.254.159: bytes=32 time<1ms TTL=128
Reply from 10.66.254.159: bytes=32 time<1ms TTL=128
Reply from 10.66.254.159: bytes=32 time<1ms TTL=128
```

MAR 17, 2007 14:41:06

```
C:\host1>ping 10.66.254.159

Pinging 10.66.254.159 with 32 bytes of data:

Reply from 10.66.254.159: bytes=32 time<6ms TTL=128
Reply from 10.66.254.159: bytes=32 time<6ms TTL=128
Reply from 10.66.254.159: bytes=32 time<6ms TTL=128
Reply from 10.66.254.159: bytes=32 time<6ms TTL=128
```

Use Common Utilities to Establish a Relative Performance Baseline for the Network

- Use the output of the traceroute command, saved into logs, and repeated over time, to establish relative network performance

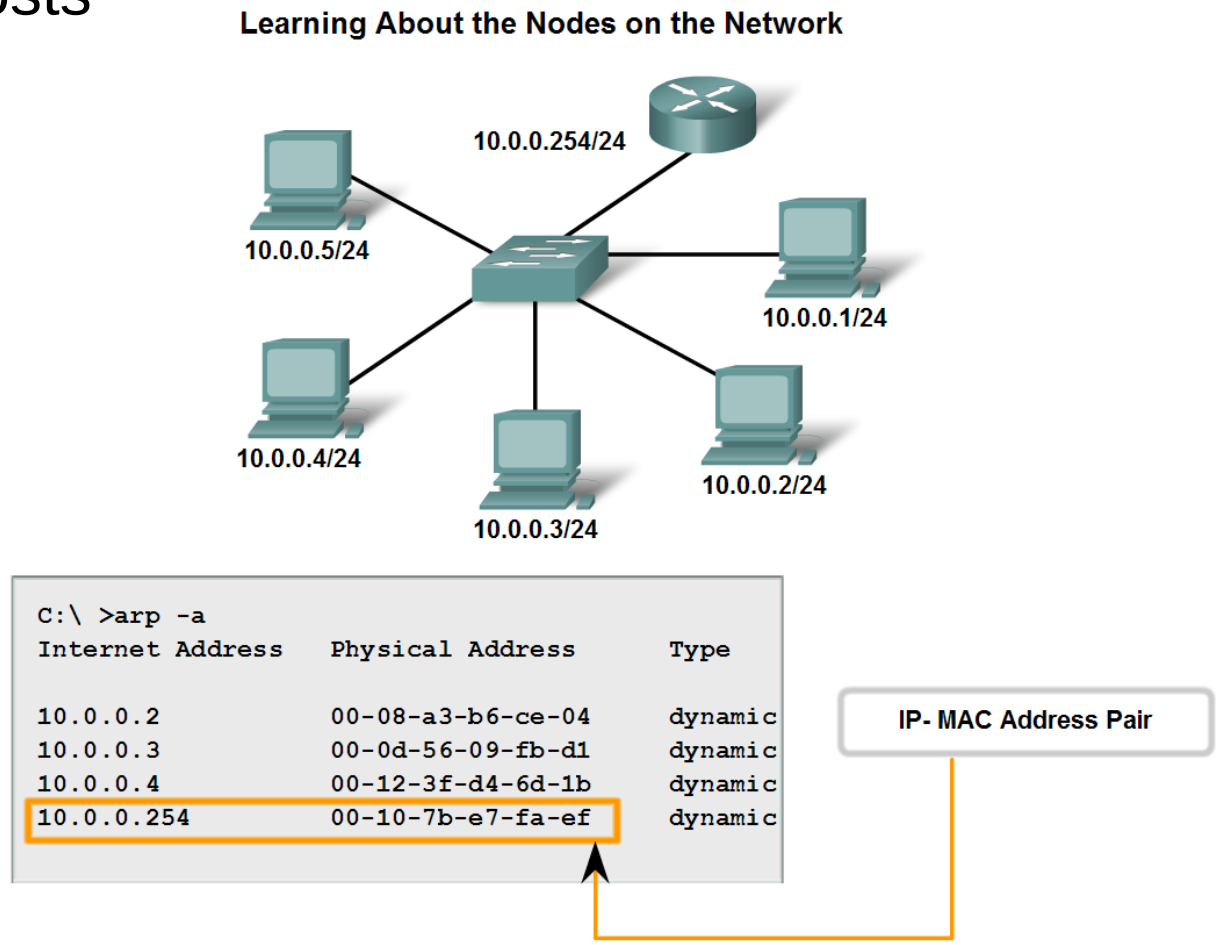
Capturing Trace Route

```
C:\>tracert www.cisco.com

Tracing route to www.cisco.com [198.133.219.25]
over a maximum of 30 hops:

  1     1 ms    <1 ms    <1 ms  192.168.0.1
  2    20 ms    20 ms    20 ms  nexthop.wa.ii.net [203.59.14.16]
  3    20 ms    19 ms    20 ms  gi2-4.per-qv1-bdr1.ii.net [203.215.4.32]
  4    79 ms    78 ms    78 ms  gi0-14-0-0.syd-ult-core1.ii.net [203.215.20.2]
  5    79 ms    81 ms    79 ms  202.139.19.33
  6   227 ms   228 ms   227 ms  203.208.148.17
  7   227 ms   227 ms   227 ms  203.208.149.34
  8   225 ms   225 ms   226 ms  208.30.205.145
  9   236 ms   249 ms   233 ms  sl-bb23-ana-8-0-0.sprintlink.net [144.232.9.23]

 10   241 ms   244 ms   240 ms  sl-bb25-sj-9-0.sprintlink.net [144.232.20.159]
 11   238 ms   238 ms   239 ms  sl-gw8-sj-10-0.sprintlink.net [144.232.3.114]
 12   238 ms   239 ms   240 ms  144.228.44.14
 13   240 ms   242 ms   248 ms  sjce-dmzbb-gw1.cisco.com [128.107.239.89]
```

Sample trace output

Use Common Utilities to Establish a Relative Performance Baseline for the Network

- Trace the steps for verifying the physical addresses of the hosts



Summary

In this chapter, you learned to:

- Define the role of the Internetwork Operating System (IOS).
- Define the purpose of a configuration file.
- Identify several classes of devices that have the IOS embedded.
- Identify the factors contributing to the set of IOS commands available to a device.
- Identify the IOS modes of operation.
- Identify the basic IOS commands.
- Compare and contrast the basic show commands.